Séminaire SelGen 2017

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Training genomic selection model across multiple breeding cycles increases genetic gain in oil palm

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Background

Reciprocal recurrent genomic selection (GS) schemes can increase annual genetic gain in oil palm. These schemes could be further improved by aggregating data of multiple breeding cycles to train the GS model.

Objectives

➔ Measure the prediction accuracy in parental populations and the genetic gain for hybrid bunch production with 2 approaches to train the GS model (Fig. A):

- *Tr2Gen* = training on the 2 most recent breeding cycles ;
- *Tr1Gen* = training on the last breeding cycle ;

and 2 RRGS schemes, over 4 cycles:

- *2PT-2noPT* = 2 cycles with progeny-tests, 2 with only GS
- *PT-noPT* = progeny-tests every 2 cycles

Material and methods

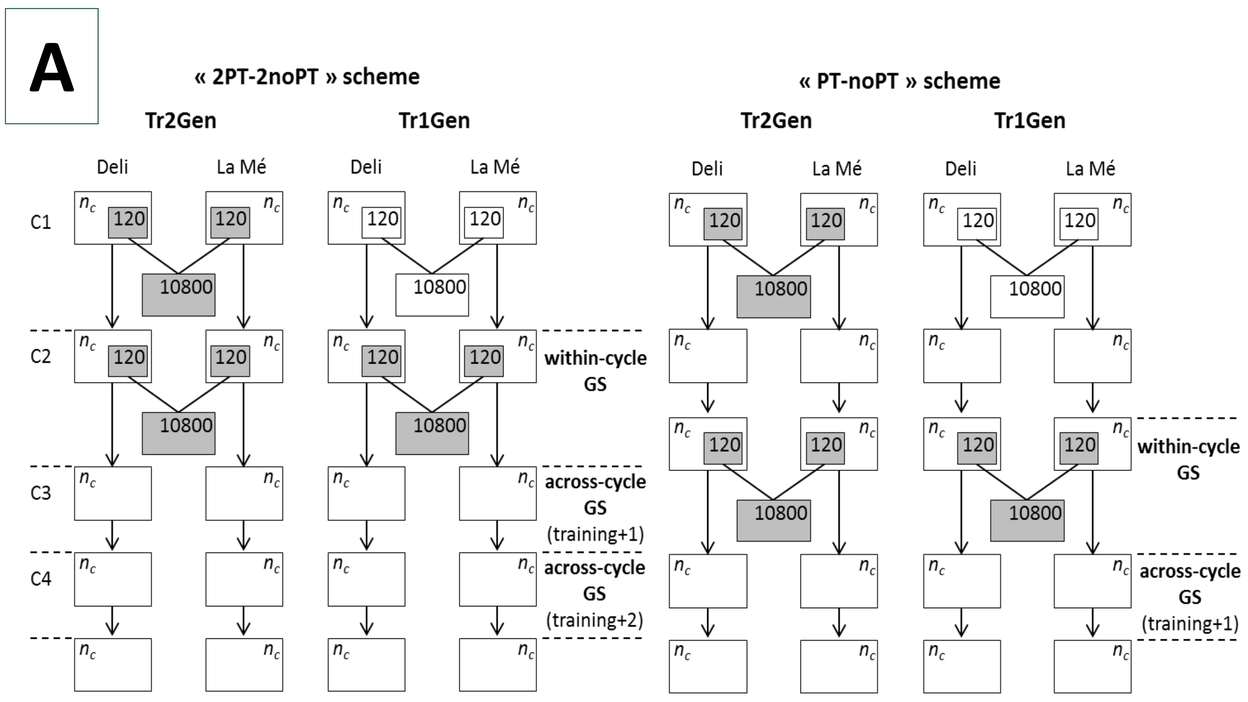
A simulation was implemented with R, using the HaploSim and ASReml packages. GS used 2500 SNPs. The breeding schemes were simulated with 270 replicates.

Results and conclusion

Tr2Gen increased the selection accuracy in all cycles and breeding schemes compared to *Tr1Gen*, with an average increase of +6.6 % (Fig. B). This resulted in an higher genetic gain per cycle, on average +12.9 % (Fig. C), with *PT-noPT* performing slightly better than *2PT-2noPT*.

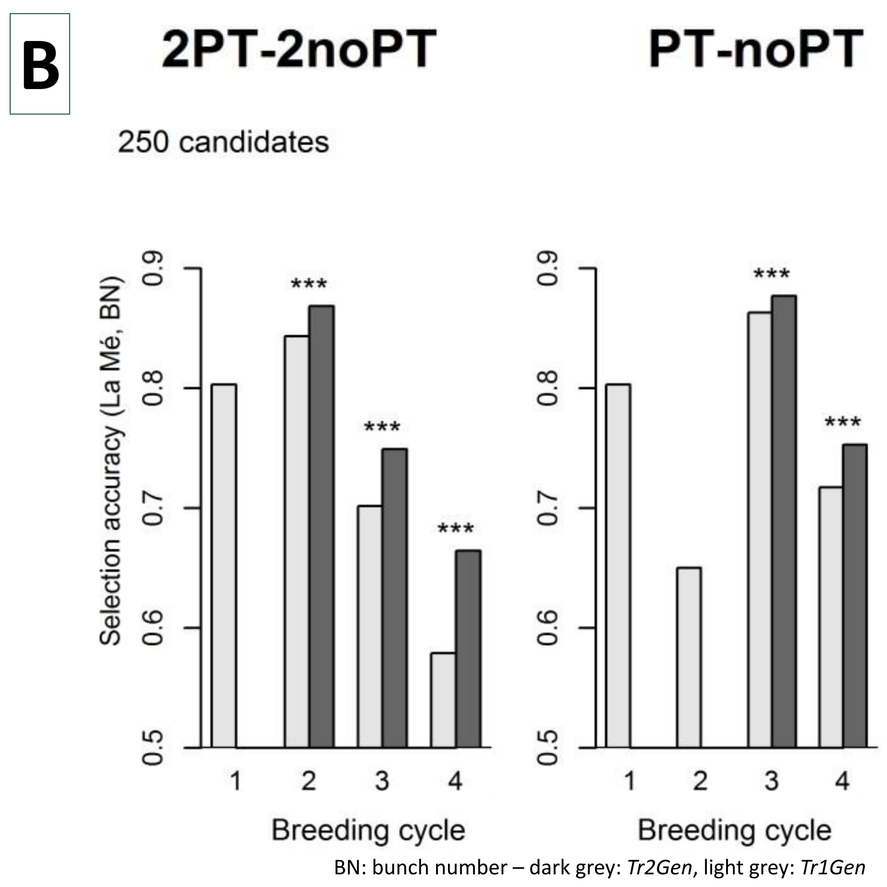
➔ ***Tr2Gen* with *PT-noPT* was the best breeding scheme**

A



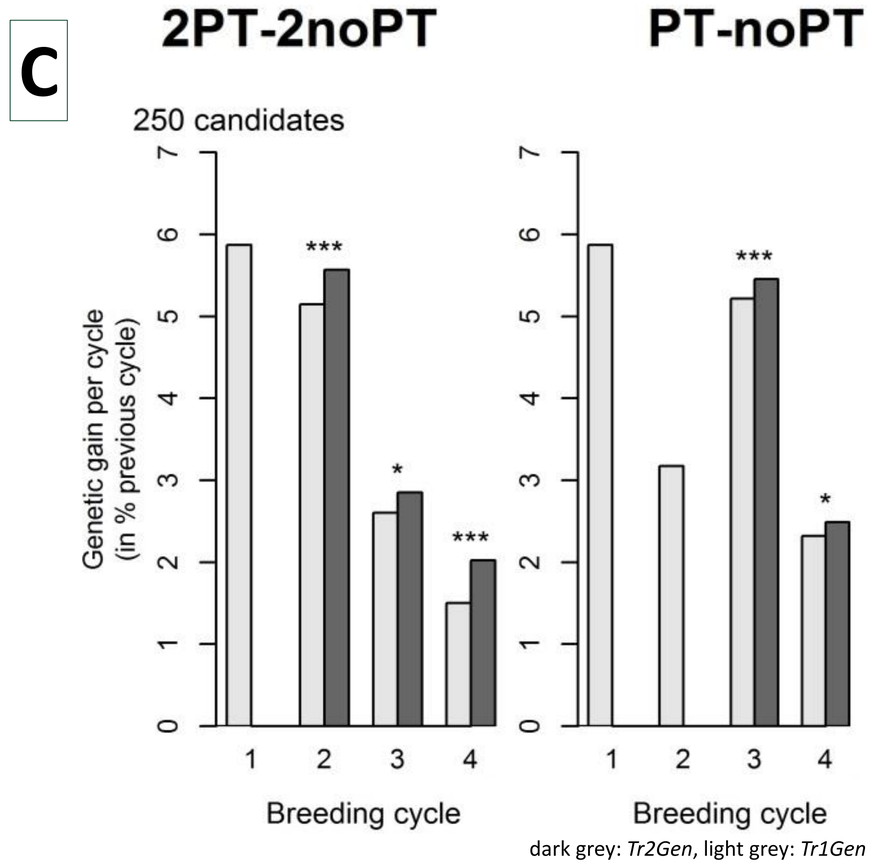
GS: genomic selection.
In the « **within-cycle GS** », 120 selection candidates were progeny tested. In the « **across-cycle GS** », no candidate was progeny tested.
Tr2Gen: GS model trained on the aggregated data of two cycles, **Tr1Gen**: GS model trained on the data of one cycle
training set for GS models (note that the only phenotyped individuals are the hybrids)
C1, C2, C3, C4: breeding cycles (with C1 starting with parental generation 0)
n_c: number of selection candidates (250 per population and cycle)

B



BN: bunch number – dark grey: *Tr2Gen*, light grey: *Tr1Gen*

C



dark grey: *Tr2Gen*, light grey: *Tr1Gen*